"OPTICAL AND DICLECTRIC PARAMETERS STUDIES AT DIFFERENT VOLTAGES IN NEMATIC AND FERROELECTRIC LIQUID CRYSTAL MATERIALS"

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Full Time

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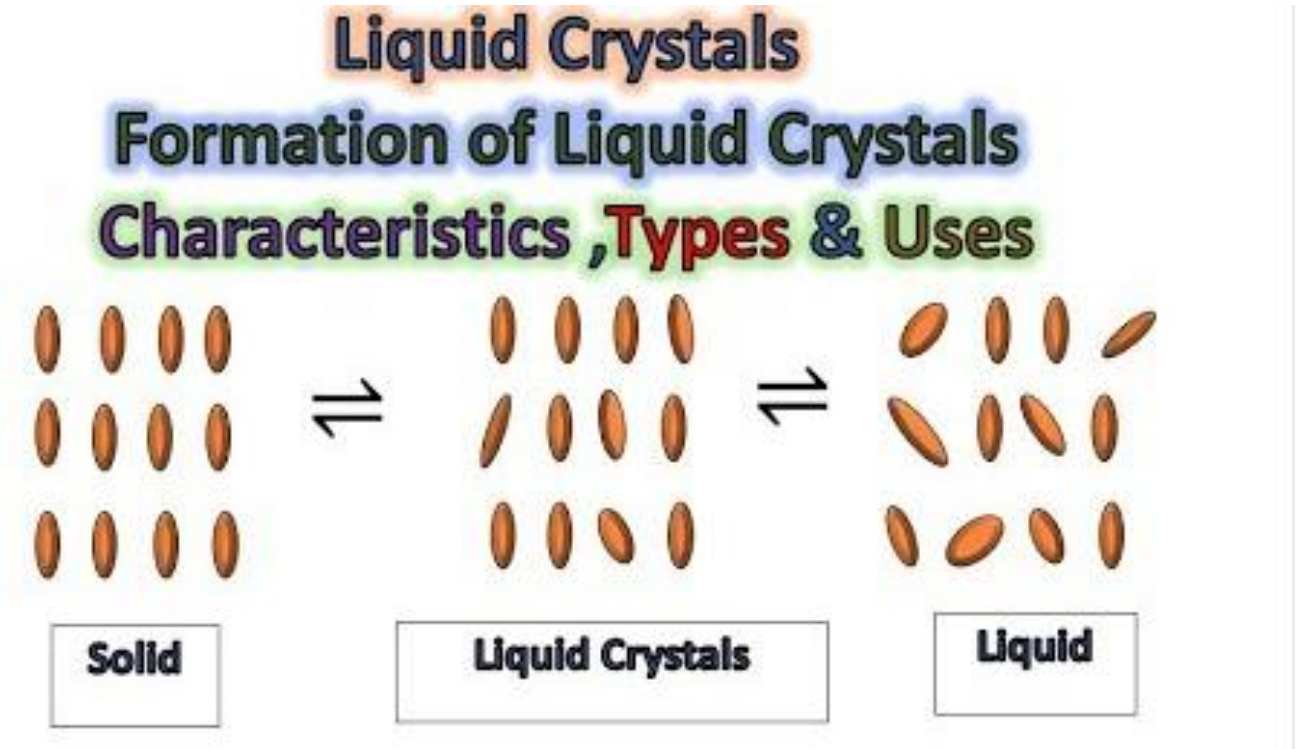
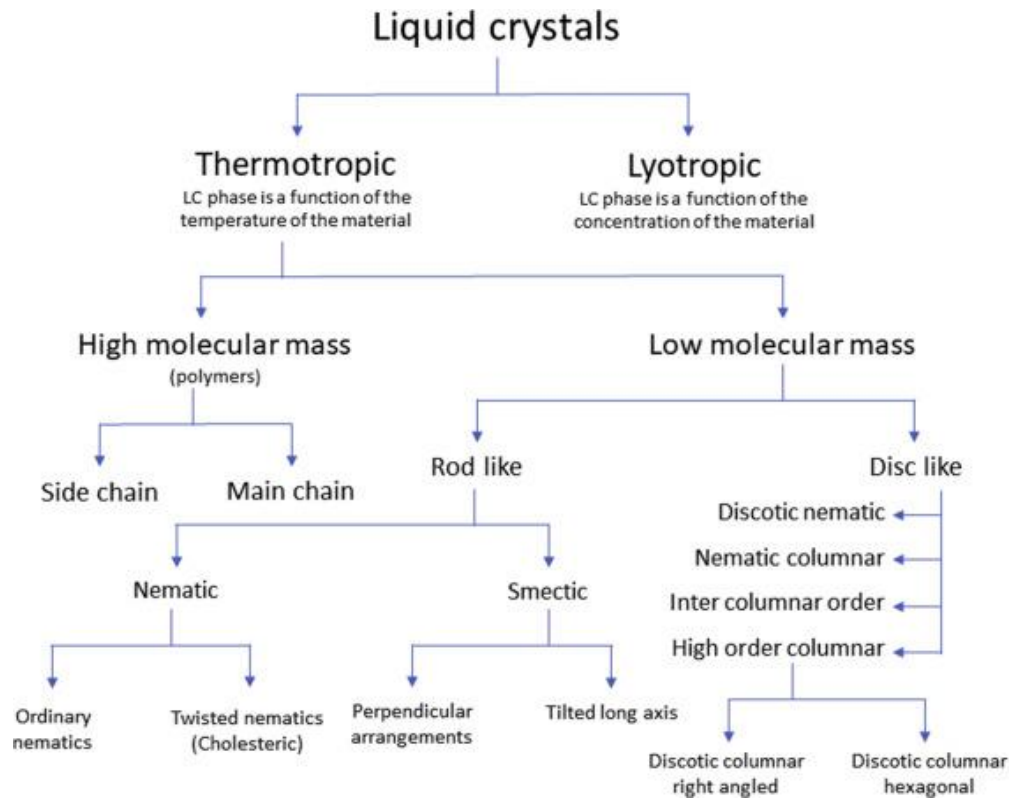
INTRODUCTION

Materials have, the different nature on the their arrangement of atoms or particles. Soft materials like liquid crystal in a state of matter that has the characteristics between those of regular used liquids and those of solid crystals.

Solid state ----> Liquid, Crystal State ----> Isotropic.

Liquid crystal areevery where. They are used in all kinds of display devices including computer monitors and laptop screens, TVS, Clooks, visors and navigation systems. Liquid crystals (LC), the orientationally ordered fluids are mysterious and extremely useful providing scientist and engineers with one of the most active and fascinating fascinating fields of research. Liquid crystal, some times called mesophases, occupy the middle ground between crystalline solids. Not all molecules have liquid crystal phases. Water molecules for ex- melt directly from crystalline ice into liquid water.





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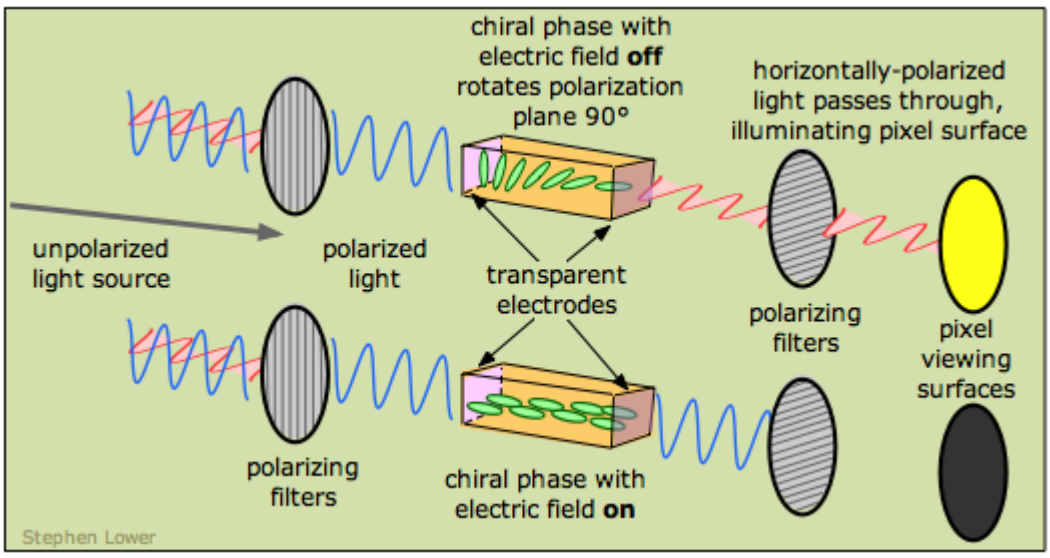
- **Optical Property of Liquid Crystal**

A liquid crystal phase has many of the physical attributes of a liquid, but its molecular units are sufficiently ordered to give rise to some anisotropy, most notable in their optical properties. Optical properties of a material define how it interests with light. The optical property of matter are studied in optical physics, the optical properties of matter include, refractive, index, dispersion.



- **Magnetic Properties of Liquid Crystal Materials :**

L.C are characterized by an orientation of order of the rod like (or possible disk-like) molecules of which they are composed. The anisotroic part of the malecular. The magnetic sensitivits of quarts “crystal resonators” in the consequence of the ferromagnetic properties of the metal used as support for application.

- **Dielectric Parameter studies:**

Dielectric spectroscopy of liquid crystals gives useful information about the static and dynamic properties of these systems. It help to understand the contributions to dielectric permittivity from collective molecular reorientation and relaxation processes. The intensive complex dielectric quantities of dielectric permittivity $\varepsilon^*(\omega)$, “electrical conductivity $\sigma^*, (\omega)$ and “resistivity $\rho^*(\omega)$ are immediately derivable from electrical impedance. Dipole relaxation behavior is normally represented in terms of ε^* and electric conduction behavior in terms of σ^*. Low frequency measurements provide information about dielectric anisotropy determines strength of interaction with applied electric field the dynamics of composite systems. At higher frequency ($\omega\tau=1$) one finds value of relaxation time (τ) and distribution parameter (α),

- **Thermal Parameter Study by DSC Method:**

Phase transition of composite liquid crystal mixtures have the major application theoretical and experimental, interest. There is no report in the open, literature regarding the phase diagram or miscibility behavior of nano-particles/liquid crystals. Differential scanning calorimetric is, one of the most widely used analytical instruments to study the Phase transition and thermodynamically properties of liquid crystals like transition enthalpy (Δ H), entropies (ΔS), latent heat capacity of composite system.

REVIEW OF LITERATURE

Raina (1987) explained the helix dynamics in the FLC compounds DOBAMBC and DOMAMBCC in ac fields from 0-20 KHz. Two relaxation processes were observed 'slow' relaxation and a 'fast' relaxation having typical relaxation frequencies 400Hz to the 1 KHz.

Fillpic et al.,(1988) studied the temperature and frequencybeliefofcomposite dielectric constant of materials near, the SmC*,-SmA, transition for the FLCs. Relaxation frequency as well as the corresponding dielectric strength was studied with a superiorconformity with the hypothetical calculations.

Biradar et al.,(1989) reported the dielectric properties of a ferroelectric liquid cryatals in differend frequency range and indentified different modes in liquid crystals.

Srivastava et al.,(1992) studied the dielectric, spectroscopy of a FLC-202,combination with planar texture in the different frequency range.

Wrobel et al.,(1995) He is studies the electro-optic and dielectric studies for a thioester, and Ferroelectric at room temperature.

S. Hiller et al.,(1996) investigated the dielectric studies processes of a ferroelectric liquid crystal materials with a phase transition.

Kutnjak etal.,(2002) studied the pressure of dispersed aerosol sub division attention on the elastic, different modes and different phases.

Tripathi P. (2013) studied that Liquid crystals possess large dielectric properties and electro-optical with mixture of dyes. **Malik P. (2014) et al.** Studied , the effect of Iron nanoparticles (Fe NPs) dispersion in 4′-(Hexyloxy)-4-biphenylcarbonitrile (6OCB) nematic liquid crystal mixtures.

Katarzyna A. et al.,(2018) Studied and reported the Experimental results of optical parameters like refractive indices of monomer-doped liquid crystalline materials are presented.

Ingo Dierking etal. (2020: Studied the Lyotropic liquid crystal and differentiate the properties of thermotropic liquid crystal in different modes.

(Muna S. Khushaim et al.(2021) Studied the simulations of nematic liquid crystal based on Cinamic materials properties and gives the applications of in photonic devices,

display processing, non-linear optics, Optical data storage, photo-switching-materials, LC monitor, holography, polarization and nano-gels for drug delivery.

- **GAP IN THE RESEARCH WORK**

It is a research questionnaires or problem which has not been answered appropriately till now. The gap, is actually seen and studies the related and find the idea, which makes our research studies report fill the research gap and not just duplicating the existing research work. Our work have a deep understanding of the status of the body of knowledge in your selected research area.

We have identifying the gaps and creating the research objective. There are many approaches for overcoming this difficulty, but finding original and innovative topics and distinguishing gaps in the literature is never an easy.

Every day in the world hundreds of journals on soft materials are published but there is a huge gap in the published work, so, there is no end, of this work. If we do some new things, it further expands the gap for new researchers.

MY OBJECTIVE:

The Experimental measurement mentioned below shall be carried out in Nematic and ferroelectric liquid crystal mixtures:

1- Determination of phase transition, transition enthalpy and transition entropies using thermal polarizing microscopy and calorimetry techniques.
2- Dielectric spectroscopy will be investigating in detail using impedance analyzer up to 1 MHz over a wide temperature range.
3- Phase identification by texture and optical studies.

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- **Purpose of Study of Liquid Crystal Materials :**

Condensed materials are everywhere like, liquid crystal materials are used in display technology, like computer screen, LCD watch, laptop , LCDTVs etc. By the molecules of a liquid crystal can control the color of device, and direction of vibration of the light that passes through them. Liquid crystals are unique in their properties having potential for numerous applied applications ranging from "optical imaging", "plasmonics, "solar cells photonic crystals", photovoltaics as well as nano-photonics, and the research in this field.